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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/275,578	03/24/1999	MASAYOSHI SHINOHARA	2803.62981	9928

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EXAMINER	
BERNATZ, KEVIN M	
ART UNIT	**PAPER NUMBER**
1773	24

DATE MAILED: 02/20/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-24

Office Action Summary	Application No.	Applicant(s)	
	09/275,578	SHINOHARA ET AL.	
	Examiner	Art Unit	
	Kevin M Bernatz	1773	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-9 and 12* is/are pending in the application.

4a) Of the above claim(s) *13-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-9 and 12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *23* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. Amendments to claim 1, filed on December 27, 2002, have been entered in the above-identified application.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Request for Continued Examination

3. The Request for Continued Examination (RCE) under 37 CFR 1.53 (d) filed on December 27, 2002 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Objections

4. Claim 12 is objected to because of the following informalities: line 3: "of" should be "or". Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. Claims 1, 2, 5, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('890) in view of Cheng et al. (U.S. Patent No. 6,361,859 B1) and Ishikawa et al. (U.S. Patent No. 5,815,343).

Regarding claim 1, Chen et al. ('890) disclose a magnetic recording disk comprising a nonmagnetic glass substrate (*Figure 2, element 20 and col. 6, line 66 bridging col. 7, line 1*) having applied thereon in the following order: an underlayer which comprises a first underlayer consisting of Cr (*col. 7, line 61*) and having a thickness of 5 to 25 nm (*col. 3, lines 13 – 19 and col. 6, lines 52 – 58*), a second sputtered underlayer consisting of nickel and phosphorous (*element 21 and col. 5, lines 37 – 43*) and a third underlayer consisting of a Cr alloy (*element 22; col. 6, lines 48 – 49; and col. 8, lines 35 - 52*) which are formed in the described order, wherein said second underlayer has a thickness of not less than 5 nm (*col. 5, lines 37 – 39*), contains P in the concentration of 15 to 33 atom % in the NiP layer (*col. 5, lines 40 – 43 and col. 7, lines 12 – 14*), and said third underlayer has a thickness of not more than 60 nm (*Table 1 and col. 8, lines 35 – 52*), and a magnetic recording layer which contains cobalt as the principal component thereof (*element 23 and col. 8, lines 53 – 62*), and also contains Cr in an amount of at least 14 at % and Pt in an amount of at least 4 at % in combination with Ta or Ta and Nb (*Table 1 – 15 at% Cr, 8 at% Pt, 4 at% Ta*).

Regarding the limitation "having non-oriented irregularities on a surface thereof", this limitations is deemed to necessarily be present in the Ohara glass substrates disclosed by Chen et al. ('890) for the reasons of record (Paragraph 5 of the Office Action mailed August 30, 2002 – Paper No. 19).

Regarding the limitation "has a widened lattice ... formed thereon", this limitations is deemed to necessarily be present in the Cr alloy underlayers disclosed by Chen et al.

('890) for the reasons of record (Paragraph 4 of the Office Action mailed December 26, 2001 – Paper No. 15).

Regarding the limitation "has a circumferential direction of easy magnetization", Chen et al. ('890) disclose a longitudinal recording medium (*col. 6, line 66*) which is deemed to necessarily meet the above claimed limitation since it is deemed the phrase "circumferential direction of easy magnetization" is simply equivalent nomenclature for a "longitudinal" or "in-plane" axis of easy magnetization (*see applicants' disclosure, page 10, lines 10 – 12 and page 19, lines 31 – 33, which talk about a "longitudinal" orientation in the magnetic layer*).

Chen et al. fail to disclose a NiP layer possessing circumferential texturing or a surface roughness in the radial direction meeting applicants' claimed limitations.

However, Ishikawa et al. ('343) teach substrates comprising metal or glass coated with NiP (*col. 17, lines 1 – 7 and col. 25, lines 48 – 51*), as used by Chen et al., wherein the NiP layer should be mechanically textured (*col. 17, lines 27 – 40*) to a surface roughness value meeting applicants' claimed limitations (*col. 17, lines 41 – 48*) inorder to improve the axis of orientation of the magnetic layer to be more "in-plane" (*col. 7, lines 28 – 43*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chen et al. ('380) to mechanically texture the NiP layer to meet applicants' claimed limitations as taught by Ishikawa et al. ('343) inorder to improve the axis of orientation of the magnetic layer to be more "in-plane".

Chen et al. ('890) and Ishikawa et al. ('343) fail to disclose a CrMo underlayer.

However, Cheng et al. teach a CrMo underlayer between a textured NiP seedlayer and a Co based magnetic layer (*col. 2, lines 23 – 30; col. 3, lines 19 – 37 and 46 – 53 and 62 – 66; and col. 4, lines 17 - 28*) wherein the CrMo promotes an increased "in-plane" orientation of the magnetic layer (*col. 4, lines 17 – 28*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chen et al. ('890) in view of Ishikawa et al. ('343) to include a CrMo underlayer as taught by Cheng et al. inorder to promote an increased "in-plane" orientation of the magnetic layer.

Regarding claim 2, Ishikawa et al. ('343) disclose texturing meeting applicants' claimed limitations (*col. 17, lines 36 – 38*).

Regarding claims 5, 9 and 12, Chen et al. disclose the claimed limitations for the reasons of record (Paragraph 4 of the Office Action mailed December 26, 2001 – Paper No. 15).

Regarding claim 8, Ishikawa et al. ('343) teach a tBr value meeting applicants' claimed range inorder to form a recording medium possessing high output and decreased noise (*col. 5, lines 1 – 8 and col. 6, lines 44 – 55*).

6. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('380) in view of Ishikawa et al. ('343) and Cheng et al. as applied above, and further in view of Ishikawa et al. ('021).

Chen et al. ('380) in view of Ishikawa et al. ('343) and Cheng et al. is relied upon as described above.

None of the above disclose a surface roughness in the circumferential direction meeting applicants' claimed limitations.

However, Ishikawa et al. ('021) teach texturing an NiP layer such that the surface roughness in the circumferential direction, Ra(θ), is controlled to be smaller than the surface roughness in the radial direction, Ra(r), (*col. 4, lines 11 – 15*) and the value of Ra(θ) meets applicants' claimed limitations (*col. 14, line 58 bridging col. 15, line 9; col. 16, lines 20 – 25; col. 17, lines 6 – 45; and Table 1*). Ishikawa et al. ('021) further teach that this leads to a recording medium possessing an increases orientation ratio, less bit errors and improved signal-to-noise ratio (*col. 14, line 58 bridging col. 15, line 20*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chen et al. ('380) in view of Ishikawa et al. ('343) and Cheng et al. to include a surface roughness in the circumferential direction meeting applicants' claimed limitations as taught by Ishikawa et al. ('021) inorder to produce a recording medium possessing an increased orientation ratio, less bit errors and improved signal-to-noise ratio.

7. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('380) in view of Ishikawa et al. ('343) and Cheng et al. as applied above, and further in view of Okuyama et al. ('227 A). See U.S. Patent No. 6,071,607, which is the U.S. equivalent of JP '227 A.

Chen et al. ('380) in view of Ishikawa et al. ('343) and Cheng et al. is relied upon as described above.

None of the above disclose magnetic layers meeting applicants' claimed limitations.

However, Okuyama et al. teach a magnetic layer meeting applicants' claimed composition inorder to obtain a combination of both low noise and high coercivity (*'607: col. 6, lines 16 – 19; col. 19, lines 43 – 46; col. 22, lines 1 – 4; and Figure 25*).

It would therefor have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the relative alloy percentages through routine experimentation, especially given the teachings in Okuyama et al. regarding preferred alloy atom percents for recording media possessing both low noise and high coercivity. *In re Boesch*, 205 USPQ 215 (CCPA 1980), *In re Woodruff*, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

8. Claims 1, 2, 5, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('890) in view of Chang et al. ('783) and Ishikawa et al. ('343).

Regarding claim 1, Chen et al. ('890) in view of Ishikawa et al. ('343) are relied upon as described above.

Chen et al. ('890) and Ishikawa et al. ('343) fail to disclose a CrMo underlayer.

However, Chang et al. ('783) teach that CrMo underlayers are equivalent to CrV underlayers when used between roughened sputtered NiP seedlayers and longitudinal

Co-based magnetic layers (*Figure 2; col. 1, lines 30 – 31; col. 5, lines 35 – 41 and lines 60 – 61; col. 6, lines 4 – 10 and lines 30 – 33; and col. 10, lines 4 – 9*).

Substitution of equivalents requires no express motivation as long as the prior art recognizes the equivalency. In the instant case, CrV and CrMo are equivalents in the field of Cr-alloy underlayers for longitudinal magnetic recording media. *In re Fount* 213 USPQ 532 (CCPA 1982); *In re Siebentritt* 152 USPQ 618 (CCPA 1967); *Graver Tank & Mfg. Co. Inc. v. Linde Air Products Co.* 85 USPQ 328 (USSC 1950).

Regarding claims 2, 5, 8, 9 and 12, Ishikawa et al. ('343) and Chen et al. ('380) disclose these limitations as described above.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('380) in view of Ishikawa et al. ('343) and Chang et al. (783) as applied above, and further in view of Ishikawa et al. ('021).

Chen et al. ('380) in view of Ishikawa et al. ('343) and Chang et al. ('783) is relied upon as described above.

None of the above disclose a surface roughness in the circumferential direction meeting applicants' claimed limitations.

However, Ishikawa et al. ('021) teach texturing an NiP layer such that the surface roughness in the circumferential direction, Ra(θ), is controlled to be smaller than the surface roughness in the radial direction, Ra(r), (*col. 4, lines 11 – 15*) and the value of Ra(θ) meets applicants' claimed limitations (*col. 14, line 58 bridging col. 15, line 9; col. 16, lines 20 – 25; col. 17, lines 6 – 45; and Table 1*). Ishikawa et al. ('021) further teach

that this leads to a recording medium possessing an increases orientation ratio, less bit errors and improved signal-to-noise ratio (*col. 14, line 58 bridging col. 15, line 20*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Chen et al. ('380) in view of Ishikawa et al. ('343) and Chang et al. ('783) to include a surface roughness in the circumferential direction meeting applicants' claimed limitations as taught by Ishikawa et al. ('021) inorder to produce a recording medium possessing an increased orientation ratio, less bit errors and improved signal-to-noise ratio.

10. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. ('380) in view of Ishikawa et al. ('343) and Chang et al. ('783) as applied above, and further in view of Okuyama et al. ('227 A). See U.S. Patent No. 6,071,607, which is the U.S. equivalent of JP '227 A.

Chen et al. ('380) in view of Ishikawa et al. ('343) and Cheng et al. ('783) is relied upon as described above.

None of the above disclose magnetic layers meeting applicants' claimed limitations.

However, Okuyama et al. teach a magnetic layer meeting applicants' claimed composition inorder to obtain a combination of both low noise and high coercivity ('*607: col. 6, lines 16 – 19; col. 19, lines 43 – 46; col. 22, lines 1 – 4; and Figure 25*).

It would therefor have been obvious to one having ordinary skill in the art to have determined the optimum value of a cause effective variable such as the relative alloy

percentages through routine experimentation, especially given the teachings in Okuyama et al. regarding preferred alloy atom percents for recording media possessing both low noise and high coercivity.

Response to Arguments

11. The rejection of claims 1 – 3, 5 – 9 and 12 under 35 U.S.C § 103(a) – Chen et al. in view of various references

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection. In so far as they apply to the present rejection of record, applicants' appear to argue that the present invention possesses "improved shock resistance and durability without reduction of S/N ratio" when compared to the closest prior art. However, the examiner notes that there is presently no evidence of record supporting applicants' argument.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M Bernatz whose telephone number is (703) 308-1737. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Thibodeau can be reached on (703) 308-2367. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0651.

KMB
February 12, 2003

Paul Thibodeau
Supervisory Patent Examiner
Technology Center 1700